CLAIMS

What is claimed is:

1. A method of measuring an attribute of a wheel having a first side and a second side, the method comprising the steps of:

obtaining wheel data by:

illuminating a first portion of the first side of the wheel with a first plurality of paths of light from a first light illumination device; and

sensing wheel data based on a first reflection of the first plurality of paths of light from the wheel; and

performing a calculation on the wheel data to measure the attribute of the wheel.

2. The method of claim 1, wherein the obtaining step further comprises the steps of:

illuminating a second portion of the first side of the wheel with a second plurality of paths of light from a second light illumination device; and

sensing wheel data based on a second reflection of the second plurality of paths of light from the wheel.

3. The method of claim 1, wherein the obtaining step further comprises the steps of:

illuminating a portion of the second side of the wheel with a second plurality of paths of light from a second light illumination device;

sensing wheel data based on a second reflection of the second plurality of paths of light from the wheel.

4. The method of claim 3, wherein the wheel is a railway wheel and the first side comprises a field side of the wheel and the second side comprises a gage side of the wheel.

5. The method of claim 1, wherein the first portion of the first side of the wheel comprises an area with a width of about 4 inches.

6. The method of claim 1, wherein the plurality of paths of light include a plurality of substantially parallel lines of light.

7. The method of claim 6, wherein the plurality of substantially parallel lines of light illuminate the first portion of the first side of the wheel in a substantially radial direction.

8. The method of claim 6, wherein the plurality of substantially parallel lines of light includes at least nineteen lines of light.

9. The method of claim 1, further comprising the step of:

determining a start time for the obtaining step.

10. The method of claim 9, wherein the determining step includes:

sensing the wheel at a first position;

sensing the wheel at a second position wherein the second position is a first known distance from the first position and a second known distance from an optimum measurement position;

calculating a time difference between the sensing at the first position and the sensing at the second position; and

calculating a start time for the obtaining step based on the time difference, the first known distance and the second known distance.

11. The method of claim 10, wherein the calculating a start time step includes calculating a speed of the wheel.

12. The method of claim 9, wherein the wheel is moving at a speed up to about fifty miles per hour.

13. The method of claim 1, further comprising the steps of:

measuring a wheel brightness for the wheel; and

adjusting an illumination brightness for the first plurality of paths of light.

14. The method of claim 1, wherein the performing a calculation step includes:

determining a bad data point in the wheel data; and

ignoring the bad data point to measure the attribute of the wheel.

15. A wheel measurement system for measuring an attribute of a wheel having a first side and a second side, the wheel measurement system comprising:

a light measuring system for obtaining wheel data with light, the light measuring system including:

a first light illumination device on the first side of the wheel for illuminating a first portion of the wheel with a first plurality of paths of light; and

a first light sensing device for sensing a first reflection of the first plurality of paths of light from the wheel and generating the wheel data; and

a control unit, in communication with the light measuring system, for measuring the attribute of the wheel from the wheel data.

16. The wheel measurement system of claim 15, wherein a light sensing device includes a filter for filtering light.

17. The wheel measurement system of claim 15, wherein the light measuring system further comprises:

a second light illumination device on the first side of the wheel for illuminating a second portion of the wheel with a second plurality of paths of light; and

a second light sensing device for sensing a second reflection of the second plurality of paths of light from the wheel and generating wheel data.

18. The wheel measurement system of claim 17, further including a wheel brightness system for sensing a brightness of the wheel; wherein the control unit adjusts the brightness of the first light illumination device and the second light illumination device based on the brightness of the wheel.

19. The wheel measurement system of claim 15, wherein the light measuring system further comprises:

a second light illumination device on the second side of the wheel for illuminating a second portion of the wheel with a second plurality of paths of light; and

a second light sensing device for sensing a second reflection of the second plurality of paths of light from the wheel and generating wheel data.

20. The wheel measurement system of claim 19, wherein a plurality of wheel attributes are measured.

21. The wheel measurement system of claim 20, wherein the plurality of wheel attributes include a rim thickness, a flange thickness, a flange height, a wheel diameter and a wheel angle of attack.

22. The wheel measurement system of claim 21, wherein the plurality of wheel attributes further includes a reference groove circle radius.

23. The wheel measurement system of claim 15, wherein the control unit includes:

a local control unit for controlling the first light illumination device and the first light sensing device; and

a system control unit, in communication with the local control unit, for calculating the attribute of the wheel.

24. The wheel measurement system of claim 15, further comprising:

a wheel sensing system in communication with the control unit.

25. The wheel measurement system of claim 24, wherein the wheel sensing system includes a wheel presence system for sensing a presence of the wheel; and

wherein the wheel presence system is a known distance from the light measuring system.

26. The wheel measurement system of claim 25, wherein the wheel presence system includes:

a first sensor disposed near a path of the wheel; and

a second sensor disposed near the path of the wheel wherein the second sensor is a known distance from the first sensor.

27. The wheel measurement system of claim 26, wherein the control unit determines a time that the wheel is in a range of the light measuring system.

28. The wheel measurement system of claim 26, wherein the first sensor includes a magnetic sensor and the second sensor includes a magnetic sensor.

29. The wheel measurement system of claim 24, wherein the wheel sensing system includes a wheel brightness system for sensing a brightness of the wheel.

30. The wheel measurement system of claim 29, wherein the control unit adjusts the brightness of a light illumination device based on the brightness of the wheel.

31. The wheel measurement system of claim 15, wherein the plurality of paths of light produce a plurality of substantially parallel lines of light.

32. The wheel measurement system of claim 31, wherein the plurality of substantially parallel lines of light illuminate the first portion of the wheel in a substantially radial direction.

33. A wheel measurement system for measuring an attribute of a wheel having a first side and a second side, the wheel measurement system comprising:

means for obtaining wheel data with light, the means for obtaining wheel data including:

means for illuminating a first portion of the first side of the wheel with a first plurality of paths of light from a single light illumination device; and

means for sensing wheel data based on a first reflection of the first plurality of paths of light from the wheel; and

means for measuring an attribute of the wheel using the wheel data.

34. The wheel measurement system of claim 33, wherein the means for obtaining wheel data further includes:

means for illuminating a second portion of the first side of the wheel with a second plurality of paths of light; and

means for sensing wheel data based on a second reflection of the second plurality of paths of light from the wheel.

35. The wheel measurement system of claim 33, wherein the means for obtaining wheel data further includes:

means for illuminating a second portion of the second side of the wheel with a second plurality of paths of light; and

means for sensing wheel data based on a second reflection of the second plurality of paths of light from the wheel.

36. The wheel measurement system of claim 33, further comprising:

means for detecting a presence of the wheel; and

means for determining a start time for the means for sensing a first reflection.

37. The wheel measurement system of claim 33, further comprising:

means for detecting a brightness of the wheel.

38. The wheel measurement system of claim 33, wherein the first plurality of paths of light include a plurality of substantially parallel lines of light.

39. The wheel measurement system of claim 38, wherein the plurality of substantially parallel lines of light illuminate the first portion of the first side of the wheel in a substantially radial direction.

40. A method of determining a start time for measuring an attribute of a wheel on a rail that supports the wheel with a measuring device, the method comprising the steps of:

attaching a first magnetic sensor to the rail;

attaching a second magnetic sensor to the rail wherein the second magnetic sensor is a known distance from the first magnetic sensor and a known distance from the measuring device;

determining a first time that the wheel is detected by the first magnetic sensor;

determining a second time that the wheel is detected by the second magnetic sensor; and

calculating the start time for measuring using the first time, the second time and the known distance from the measuring device.

41. The method of claim 40, wherein the calculating the start time step includes calculating a speed of the wheel.

42. A method of measuring an attribute of a wheel using a path of light, the method comprising the steps of:

determining a brightness of the wheel;

adjusting a brightness of a path of light based on the brightness of the wheel;

illuminating a portion of the wheel with the path of light;

sensing wheel data based on a reflection of the path of light from the wheel; and

performing a calculation on the wheel data to measure the attribute of the wheel.

43. The method of claim 42, wherein the illuminating step uses a plurality of paths of light.

44. A computer program product comprising a computer useable medium having computer readable program code embodied therein for measuring an attribute of a wheel, the program product comprising:

program code configured to control a light illumination device for illuminating the wheel with a plurality of paths of light;

program code configured to control a light sensing device that obtains wheel data based on a sensed reflection; and

program code configured to perform a calculation on the wheel data to measure the attribute of the wheel.

45. The computer program product of claim 44, further comprising:

program code configured to determine a start time for illuminating the wheel and a start time for obtaining the wheel data.

46. The computer program product of claim 44, further comprising:

program code configured to determine a bad data point in the wheel data; and

program code configured to ignore the bad data point in measuring the attribute of the wheel.

47. The computer program product of claim 44, further comprising:

program code configured to determine a brightness of the wheel; and

program code configured to adjust a brightness of a plurality of paths of light based on the brightness of the wheel.